MobileComm's proposed VIP service addresses these needs. As planned by MobileComm, VIP service will be available throughout metropolitan areas nationwide and will be capable of providing service options ranging from alphanumeric paging service with automatic verification of receipt by the user's terminal, all the way to data transmissions with a variety of user-selectable responses. A VIP subscriber will not have to carry an ordinary pager as well as a VIP-equipped terminal.[3]

A. Features of VIP Service

MobileComm's proposed VIP service is designed to meet the needs of a variety of data and paging subscribers. The service delivered to all subscribers will be based on a nationwide array of metropolitan wide-area transmission networks. The VIP concept calls for nationwide, simulcast, high-volume, high-speed one-way data delivery transmissions with a variety of response or acknowledgment options for the subscriber.

Some of the innovative features planned for VIP service are:

- *Autonomous Registration and Automatic Message Routing:* The terminal equipment will autonomously register with the system upon power-up or change of service area. Messages for the terminal will be routed automatically to the transmission system covering the unit's last known location, or to the unit's home coverage area. If the terminal does not acknowledge receipt of the transmission ("link-level acknowledgment"), message delivery is attempted nationwide.

- *Delayed Transmission of Undeliverable Messages:* Message transmissions not resulting in link-level acknowledgment will be stored for a predetermined time until delivered. When a terminal registers, any stored undeliverable messages will immediately be sent.

- *Alternative Delivery of Undeliverable Messages:* A subscriber would be able to select a variety of treatments for undeliverable messages, such as delayed transmission (described above), routing by voice-mail, landline E-mail, or facsimile — perhaps even next-day or same-day courier delivery. Different means of delivery could be specified for various types of undeliverable transmissions — short alphanumeric messages by synthesized speech and longer messages by facsimile, for example.

[3] Although the issue should not be a concern of the Commission in reviewing MobileComm's request, MobileComm will seek appropriate waivers, if any should be required, of the restrictions contained in the Modification of Final Judgment.

- *Soft Key Response Option:* Subscriber equipment may be equipped with a variety of customizable "soft keys" that allow a variety of responses to messages. These soft keys could also be set to provide a custom-designed response automatically upon receiving messages during a predetermined period of time. For example, a subscriber could press a key before a meeting that would cause the unit to acknowledge messages arriving during the next hour with a "Received but not read due to do-not-disturb status" message. A soft key could also be pressed to specify an immediate alternative delivery method or to change the alternative delivery method for future undeliverable messages.

- *Received and Read Acknowledgment Option:* Subscriber equipment could transmit a "Received and read" acknowledgment if a received message were read within a specified number of seconds of reception, and otherwise transmit "Received but not read" acknowledgment.

- *Security and efficiency features:* Messages may be encrypted to satisfy user security needs, and message transmission will be compressed in order to maximize spectral efficiency and system capacity.

- *Multimedia message delivery:* The system architecture is designed to support anticipated enhanced services such as digitized, packetized voice and graphics. *Pictures and graphics* can be transmitted efficiently in a store-and-forward network using readily available compression techniques; graphical data transmissions would require either an auxiliary display device, such as a palmtop computer, or a second-generation terminal device with built-in graphics capability. Similarly, *digitized, packetized voice messages* may be delivered to the unit in a compressed format in a series of transmissions, in order to conserve system resources and maximize throughput. When the entire message is received, it would be decompressed, reassembled, and played through an earphone plugged into the unit, upon pressing the "read" key. *Messages with sound and graphics* would be well within the network's capability by the time suitable subscriber equipment became available.

B. Subscriber equipment

Many of the features described above would be phased in as subscriber terminal equipment becomes increasingly sophisticated, in response to customer demands and network capabilities. Given the highly responsive nature of the computer and communications equipment industry, a first-generation terminal unit providing many of these capabilities could be available within a year after a volume order is placed.

MobileComm believes, based on its inquiries in the industry, that a first-generation unit the size of a current alphanumeric pager would sell for a wholesale price of about $250 and would have a 4-line, 40-character readout and a 128 kilobyte random-access memory, permitting storage of 20 E-mail messages, direct display of short (one-line) messages, scrolling of medium-length messages, and display of longer messages by connection to an external computer or printer. The initial units would incorporate link-level acknowledgment and have some form of user acknowledgment. More sophisticated features, such as multiple soft-keys and graphic display, would likely be introduced quickly as the user base grows and becomes more demanding. Similarly, wireless interfaces allowing palmtop and laptop computers to function as sophisticated VIP terminals with the use of suitable software would likely become available rapidly once the service were authorized by the Commission.

C. VIP Network Design and Management

The networks used to provide VIP service to user terminals will use multiple high-power simulcast transmitters within metropolitan areas; these transmission systems will be linked together with a centralized computer functioning as a network controller by means of an intelligent network infrastructure incorporating a variety of landline and satellite facilities.

The radio transmission system used to provide VIP service will use an open, standard protocol, rather than a proprietary protocol. This has the advantage that it can be incorporated into the offerings of multiple manufacturers. This will make possible multiple sources of supply, which is essential to the establishment of a competitive equipment market, a prerequisite to the development of a large-scale service. Under the control of a centralized computer, the length of base station and terminal transmission cycles can be varied dynamically in response to changing load conditions. The computer will also coordinate the base stations' scheduling of transmissions to terminals with known locations; this will permit simultaneous transmissions to different terminals by the base stations in different zones, when the terminals' locations are known.

The base stations will simulcast, permitting superior building penetration and service continuity. Simulcasting the transmissions, instead of utilizing a cellular approach, will allow the network to grow at low cost without adherence to an idealized transmission network design.

MobileComm plans to utilize enhanced multi-level frequency-shift keyed modulation techniques, which will allow data transmission rates of up to 15,000 bps in a 50 kHz channel in a simulcast system (based on 8-level FSK modulation, which can be readily implemented in a robust manner).[4] Base stations would operate at up to 3500 watts effective radiated power,[5] which will facilitate wide-area coverage and building penetration with a minimum number of transmitter sites.[6]

Because the terminal units will not require full two-way data transmission ability, but rather only the ability to transmit brief coded acknowledgment signals, a slower bit rate (1200 bps), a 2-level FSK modulation scheme and a narrower bandwidth (12.5 kHz) can be used on the return path. Under these circumstances, the forward (base station) channel and reverse (terminal unit) channel range can be balanced for equivalent transmission range by use of the design criteria of a two-watt ERP terminal transmitter, 60° high-gain sectorized receive antennas, and highly sensitive base receivers.[7] This balanced system design has the advantages of generally requiring reverse channel receivers only at the base station locations, with no additional receive-only sites needed in most cases. Furthermore, the reverse channel design criteria assures that the signaling will be reliable, minimize the terminal cost and complexity, and permit the terminal to do away with an extendable antenna and use normal pager batteries, for simple, low-cost

---

[4] Using 8-level FSK results in a modulation efficiency of three bits per baud; coupled with a 5000 baud symbol rate, this yields a 15,000 bps bit rate, which permits the MobileComm terminal unit to be more robust and sensitive than a unit designed to receive data in a multipath environment at the 24,000 bps bit rate proposed by Mtel in its NWN proposal. *See* John B. Berry, Jr. Affidavit, contained in Appendix A.

[5] Mtel's proposal contemplates transmitting with 500 watts output and 3500 watts effective radiated power also. However, Mtel also admits that its technical approach requires linear Class A amplifiers. See Mtel Petition for Rulemaking, RM-7978, at 20 n.19; Mtel Pioneer's Preference Request, File No. PP-37, at 14, 22. However, Mtel's high power requirement appears excessive, in view of Mtel's linear modulation proposal. *See* Appendix I at 1 n.1.

[6] Because of the MobileComm VIP system's more sensitive terminal unit (*see* note 3, *supra*), the maximum transmission range of a single transmitter, taking multipath and building penetration into account, is about 6.0 miles, which requires about 1.1 transmitters per 100 square miles. A comparable system using Mtel's NWN parameters would have base stations with a range of 2.0 miles, requiring 9.6 base stations to cover 100 square miles. *See* Appendix A.

[7] The user terminals in the VIP system would, under these circumstances, have a range of 5.9 miles, nearly identical to the range of the base stations, with 1.1 receive site per 100 square miles. *See* Appendix A.

operation.[8] Terminals will access the VIP network utilizing an access method based on a variation of the slotted ALOHA algorithm for reducing the probability of collision among transmissions from competing terminals. Protocols utilized for the air interface contain appropriate synchronization, identification, and error detection and correction techniques.

The VIP system's efficiency in meeting substantial demand within a relatively narrow band of spectrum requires extremely precise synchronization of the modulated radio signals, due to the multipath effects inherent in the simulcast environment, and of the scheduling of forward and reverse channel transmissions. MobileComm plans to achieve precise network synchronization by reference to the Global Positioning Satellite System. Overall network control will accomplished through the use of centralized computer facilities.

D. Nationwide operation

The highly precise synchronization that is needed in the VIP system at the data scheduling level can be efficiently accomplished only if a single computer is in control. Furthermore, a critical feature of VIP is that a terminal whose location is unknown can be immediately located, after a failure to respond at its last known location, by retransmission of the unacknowledged message nationwide. While it would be *possible* for separately licensed systems in different regions to closely coordinate their operations so as to achieve these requirements, the separate operation of regional systems on a single frequency would necessarily introduce considerable inefficiencies and would pose the possibility of significant interference if precise synchronization were not maintained.

If there were separately licensed systems sharing a channel on a regional basis, the necessary level of coordination and synchronization could be achieved only if the licensees either (a) share the use of a single computer for joint control of their networks or (b) use separate

---

[8] *See* Appendix A.

computers that in turn are linked together. Under the first scenario, the various regional licensees would in effect share ownership of a single unified nationwide system and would have an economic incentive to merge into a nationwide VIP consortium to eliminate the inefficiencies of separate administrative organizations. Under the second scenario, the inefficiencies of the first case would be compounded by the cost of establishing and maintaining multiple control computers and the complex network needed to link them together; there would also be the danger of uncoordinated operation in the event the linkage between the computers were insufficient. In either case, the licensees would have to use a single agreed-upon method of radio signal synchronization to avoid destructive interference in border areas.

In light of these facts, MobileComm submits that there should be a single national licensee for VIP operations on any single 50 kHz channel. For both technical and economic reasons, VIP service is essentially nationwide in scope.

II. A FLEXIBLE REGULATORY SCHEME CAN ACCOMMODATE BOTH MTEL'S NWN SYSTEM AND MOBILECOMM'S VIP SYSTEM, THEREBY SERVING THE PUBLIC INTEREST

MobileComm generally supports the proposed flexible regulatory scheme for licensing three nationwide advanced messaging service providers who would be free, within reasonable limits, to pursue differing service concepts. Mtel set forth its model of such a service but recognized that there is no one "best" service model. The adoption of a flexible regulatory scheme that will allow each of three nationwide licensees to develop its own service concept in response to evolving technology and customer demands is indeed an approach that will serve the public interest.

MobileComm's VIP proposal has many similarities to Mtel's NWN model, but it has many significant differences. Both companies are experienced providers of nationwide paging service and are familiar with both technological developments and customer needs, and the two companies have developed approaches that are based on their assessments of the future direction of the messaging industry. Both companies recognize the limitations of today's paging services. Both Mtel's NWN and MobileComm's VIP represent reasonable attempts to provide a broader range of services to an increasingly mobile, information-dependent society by companies well-positioned to meet society's messaging needs.

The two companies have developed services that will meet the needs of two different types of mobile, information-dependent customers. Some customers have two-way messaging needs and some need a more comprehensive and secure one-way messaging system. The adoption of a regulatory scheme that will permit two leading nationwide paging providers to develop their competing visions of tomorrow's nationwide messaging network on an equal footing will clearly serve the public interest. This would encourage service differentiation and facilities-based competition, thereby enriching the choices available to the customer.

The FCC need not select one company's approach over the other, because an allocation of spectrum for multiple providers will allow the marketplace to choose the service that best meets subscribers' needs. In any event, the adoption of a regulatory scheme that would prevent companies such as Mtel and MobileComm from developing competing approaches to national wireless messaging services would clearly be contrary to the public interest, because it would tend to tilt the level playing field in favor of one competitor and thereby impair the facilities-based competition that now exists. Accordingly, it is vital that the Commission allocate spectrum for multiple nationwide wireless messaging services under a flexible approach that can accommodate different approaches.

CONCLUSION

For the foregoing reasons, MobileComm supports the allocation of three 50 kHz channels in the 930-31 MHz band for nationwide messaging service under a flexible regulatory scheme that can accommodate multiple service concepts, such as MobileComm's proposed VIP service.

Respectfully submitted,

MOBILE COMMUNICATIONS CORPORATION OF AMERICA

By: Michael Deuel Sullivan/BSR

L. Andrew Tollin
Michael Deuel Sullivan

Wilkinson, Barker, Knauer & Quinn
1735 New York Avenue, N.W.
Washington, D.C. 20006
(202) 783-4141

By: David G. Richards

William B. Barfield
Charles P. Featherstun
David G. Richards

1155 Peachtree Street, N.E.
Suite 1800
Atlanta, Georgia 30367-6000
(404) 249-2641/(202) 463-4155

Its Attorneys

June 1, 1992

Appendix A

Affidavit of
John B. Berry, Jr.

Affidavit

I, John B. Berry, Jr., being duly sworn do hereby make the following statement:

1. I am an independent Radio Engineering Consultant. I have been retained by BellSouth Enterprises, Inc. to review certain radio engineering features pertaining to advances in the art of radio paging and wireless messaging.

2. I am a graduate Electrical Engineer with a BSEE degree from Clemson University and an MSEE degree from Georgia Institute of Technology. I have been active in radio engineering for the last 39 years. I have consulted actively as a Radio Engineer for the last 7 years. My clients include BellSouth Enterprises, Inc.; BellSouth Mobile Data; BellSouth Mobility Inc; A T & T Technologies; and the International Telecommunications Union (ITU). I also teach courses in Radio Engineering for The George Washington University and the University of Alabama at Birmingham.

3. Specifically, I have prepared an engineering analysis comparing the expected radio link performance of several radio paging and Advanced Messaging Systems (AMS). In the process of this analysis, several enhancements in a new "VIP" verified information paging system being proposed by a BellSouth Enterprises subsidiary, MobileComm, have been suggested and incorporated therein.

4. A comparison of the expected radio link performance of two of these systems is attached as part of Appendix A. This comparison has been prepared and summarized in a spreadsheet format using 4 columns as shown. The first column is the parameter of interest, the second is the unit of measurement, the third and fourth columns contain data and calculated results for the two comparative systems: MTel's NWN system and MobileComm's VIP system.

5. Most of the data shown for the MTel NWN system were taken from copies of their filings with the FCC in ET Docket No. 92-100, RM 7978. However, in order to complete the radio engineering comparison, certain *assumptions* were made regarding parameter data not included with their filings.

6. Two parameters that are critical to computing radio link performance are power output and receiver sensitivity. In the case of MobileComm's VIP system, a major manufacturer of paging transmitters

has tested 8 level FSK modulation and finds that it is compatible with Class C power amplifiers and power output at the 500 watt level. Also, 8 level angle modulation detection systems are well documented and the resulting receiver sensitivity figures can be computed directly. However, similar information on the proposed MTel "MOOK" modulation and demodulation schemes is almost nil. For example, MTel requests authority for 3500 watts ERP in its pioneer preference filing and that is the figure used in the comparison. MTel admits that *Class A linear amplifiers* will be required. Therefore, the 3500 watt ERP power level is suspect. Also, receiver performance for an 8 bps per baud parallel demodulation scheme is unknown. For the purpose of the comparison, calculations were based on a 256 level (8 bps/baud) *phase demodulation* receiver's expected noise performance.

7. The attached spreadsheet comparison uses engineering approximations to compute expected radio link parameters and the resulting expected range. The final result is more of a *comparison of the two systems under the same propagation conditions* than a claim of exactness in parameter values.

John B. Berry, Jr.

John B. Berry, Jr.

May 29th, 1992

Date

Sworn to and subscribed
before me this 29th day
of May, 1992.

Amy Lynne Keith

Notary Public

Notary Public, Cobb County, Ga.
My Commission Expires Jan. 23, 1995

Comparison of MTel's NWN and MobileComm's VIP vs Propagation			
Forward channel		**Mtel**	**MobileComm**
Base station:		**NWN**	**VIP**
Bit rate,	Bps	24000	15000
Channel bandwidth,	KHz	50	50
Frequency band,	MHz	931	931
Type of modulation		8T "MOOK"	8FSK
Number of effective modulation levels	m	256	8
*Modulation efficiency [n=Log2(m)]	Bits/Baud	8	3
*Symbol rate,	Baud	3000	5000
*Modulation efficiency,	Bits/Hertz	0.48	0.3
Power output NOTE 1,	Watts	500	500
Fixed losses (feeders, multicoupler, etc),	dB	2.75	2.75
Paging base antenna gain,	dBi	11.2	11.2
*EIRP,	Watts	3500	3500
*EIRP,	dBm	65.4	65.4
Pager or Terminal unit:			
Eb/No for 10^-2 BER (theory) NOTE 2,	dB	26	9
*Pager/terminal sensitivity for 10^-2 BER,	dBm	-84	-101
Pager/terminal antenna gain	dBi	0	0
*Overall pager/terminal sensitivity (incl ant),	dBu	49	32
Forward channel characteristics:		Suburban	Suburban
Environment:		In-Bldg	In-Bldg
Allowance for multipath NOTE 3,	dB	10	10
Allowance for building penetration,	dB	20	20
*Total allowable radio path loss (in-bldg),	dB	119.7	136.3
Forward signal loss factor (Gamma)	dB/decade	35.0	35.0
Free space distance (ant to environment)	meters	212.0	212.0
***Max. paging range,**	mi.	2.0	6.0
*Hex cells per square mile		0.0960	0.0108
***Total base transmitters/100 sq mi**		9.6	1.1
NOTES:			
1. MTel's 500 watts appears excessive for the linear modulation scheme proposed.			
2. Does not include noise penalties for non-linear distortion in 8T MOOK transmitter and receiver.			
3. Does not include additional allowance for probable lack of adaptive equalization for 8T MOOK receiver.			

*Calculated result

J. B. Berry 5/29/92

Comparison of MTel's NWN and MobileComm's VIP vs Propagation			
Reverse channel		**Mtel**	**MobileComm**
Terminal/pager:		**NWN**	**VIP**
Bit rate,	Bps	9600	1200
Channel bandwidth,	KHz	50	12.5
Frequency band,	MHz	931	931
Type of modulation		BPSK	BFSK
Modulation level,	Bits/Baud	1	1
*Symbol rate,	Baud	9600	1200
*Modulation efficiency,	Bits/Hertz	0.192	0.096
Peak power,	Watts	7	2
Fixed losses	dB	0	0
Terminal/pager antenna gain,	dBi	0	0
*Peak EIRP,	Watts	7.0	2.0
*Peak EIRP,	dBm	38.5	33.0
Base station:			
*Base receiver sensitivity for 10^-2 BER,	dBm	-107	-116
Fixed losses (feeders, etc),	dB	3	1
Base station receiver antenna gain	dBi	11.2	18.2
Reverse channel characteristics:		Suburban	Suburban
Environment:		In-Building	In-Building
Allowance for multipath,	dB	10	10
Allowance for bldg penetration,	dB	20	20
*Total allowable radio path loss (in-bldg)	dB	123.6	136.2
Reverse signal loss factor (Gamma)	dB/decade	35.0	35.0
Free space distance (ant to environment)	meters	212.0	212.0
***Max. reverse channel range (R),**	**mi.**	**2.6**	**5.9**
*Hex receiving cells per square mile		0.057	0.011
***Total base receivers/100 sq mi**		**5.7**	**1.1**

CERTIFICATE OF SERVICE

I, David Richards, hereby certify that on this 25 day of June, 1992, copies of the foregoing "Request For Pioneer's Preference" of Mobile Communications Corporation of America were mailed, first-class postage prepaid, to the following:

Gerald S. McGowan
Marjorie Giller Spivak
Lukas, McGowan, Nace & Gutierrez, Chartered
1819 H Street, N.W., 7th Floor
Washington, D.C. 20006

Thomas J. Casey
Jay L. Birnbaum
Skadden, Arps, Slate Meagher & Flom
1440 New York Ave., N.W.
Washington, D.C. 20005

Richard Wiley
R. Michael Senkowski
David E. Hilliard
Eric W. DeSilva
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, D.C. 20005

Mark A. Stachiw
PacTel Paging
Three Forest Plaza
12221 Merit Dr., Suite 800
Dallas, Texas 75251

Jeffrey Blumenfeld
Glenn B. Manishin
F. Thomas Tuttle
Blumenfeld & Cohen
1615 M Street, N.W.
Suite 700
Washington, D.C. 20005

David Richards

David Richards